Development and Psychopathology (2025), 1–16
doi:10.1017/S0954579424001949

CAMBRIDGE UNIVERSITY PRESS

Regular Article

Developmental trajectories of conduct problems from childhood to adolescence: Early childhood antecedents and outcomes in adolescence

Olivier F. Colins[1,2], Kostas A. Fanti[3], Karin Hellfeldt[2], Louise Frogner[2] and Henrik Andershed[2]

[1]Department of Special Needs Education, Ghent University, Gent, Belgium, [2]School of Behavioural, Social and Legal Sciences, Örebro University, Örebro, Sweden and [3]Department of Psychology, University of Cyprus, Nicosia, Cyprus

Abstract

Children and adolescents display varying trajectories of conduct problems (CP), but it is unclear if these CP trajectories can be distinguished by childhood antecedents and adolescent outcomes. Therefore, we tested if child- and environmental-level risk factors predict CP trajectory membership and if CP trajectories are associated with developmental outcomes in adolescence. Six waves of data (teacher-, parent- and child self-reports) were used from 2,045 children. General growth mixture modeling identified four CP trajectories (waves 2–5): childhood-persistent, childhood-limited, adolescent-onset, and low CP. Relative to the adolescent-onset CP trajectory, wave 1 child- and environmental-level risk factors increased the likelihood of being in the childhood-persistent CP trajectory, though all but two (callous-unemotional traits and non-intact family) antecedents lost significance after controlling for wave 1 conduct problems. Few significant differences emerged in risk factors when comparing childhood-persistent and childhood-limited CP trajectories. Individuals identified in the adolescent-onset and childhood-persistent CP trajectories faced a higher risk for later maladjustment than those in the childhood-limited CP trajectory, whereas the adolescent-onset and childhood-persistent CP trajectories only differed in three out of 13 outcomes. Overall, findings indicate that individuals with CP are at risk for later maladjustment, but predicting the childhood-persistent trajectory of CP in young children is difficult.

Keywords: adolescent outcomes; antecedents; conduct problems; cumulative risk; developmental trajectories

(Received 3 June 2024; revised 11 December 2024; accepted 14 December 2024)

Introduction

Children and adolescents with conduct problems (CP) are heterogenous in terms of etiology, severity, and outcomes (e.g., Fairchild et al., 2019). To understand this heterogeneity, Moffitt (1993, 2018) proposed to subtype these youth based on the age of onset of their CP. According to the theory, CP that originate early in life ("childhood-onset") are caused by a combination of child-level (e.g., hyperactivity and difficult temperament) and environmental-level (e.g., poor parenting and poverty) risks, persist into adulthood, and lead to maladjustment in multiple life domains (Moffitt, 1993, 2018). In contrast, CP that emerge around puberty ("adolescent-onset") is theorized to be initiated by a maturity gap that makes affiliation with and mimicry of delinquent peers appealing, primarily leading to non-aggressive behaviors (Moffitt, 1993, 2018). Adolescent-onset CP are theorized to be typically limited to adolescence. Substantial evidence supports this theory, though evidence also indicates that childhood-onset CP persist across development only for a minority of children ("childhood-persistent"), with the vast majority showing a decline in CP prior to adolescence ("childhood-limited") (Fairchild et al., 2013). Importantly, Fairchild et al. (2013) also showed that the developmental antecedents of childhood-persistent, childhood-limited, and adolescent-onset CP trajectories differ quantitatively (i.e., in number, magnitude, and range) rather than qualitatively (i.e., unique risk factors), as originally proposed by Moffitt (1993).

Revising Moffitt's' (1993) theory for the emergence, desistance, and persistence of CP, it has, therefore, been proposed that the two childhood-onset CP trajectories show more child-level and environmental-level risk factors than the adolescent-onset CP trajectory, whereas the childhood-limited CP trajectory is hallmarked by fewer environmental-level risk factors, relative to the childhood-persistent CP trajectory (Fairchild et al., 2013). These suggestions remain understudied, whilst available work that explored the viability of the revised theory is also not without methodological limitations. In fact, most studies failed to span across childhood and adolescence, making it impossible to identify childhood- and adolescent-onset CP trajectories (e.g., Cyr et al., 2022; Kretschmer et al., 2014). In addition, the majority of trajectory studies that used data from childhood to adolescence failed to compare adolescent-onset and childhood-limited CP trajectories, even though both trajectories were identified (Martins-Silva et al., 2022, 2024). Other studies introduced temporal overlap between risk factors and CP trajectories, making

Corresponding authors: Olivier F. Colins; Louise Frogner; Emails: olivier.colins@ugent.be; louise.frogner@oru.se

Cite this article: Colins, O. F., Fanti, K. A., Hellfeldt, K., Frogner, L., & Andershed, H. (2025). Developmental trajectories of conduct problems from childhood to adolescence: Early childhood antecedents and outcomes in adolescence. *Development and Psychopathology*, 1–16, https://doi.org/10.1017/S0954579424001949

it unclear if the risk factors were developmental antecedents or concurrent correlates of CP trajectories (e.g., Barker et al., 2010; Bauer et al., 2021). The range of child-level and environmental-level risk factors that were considered as possible antecedents also greatly varied between studies, underscoring the need to replicate prior findings. Thus, longitudinal studies are warranted to test if childhood-persistent, childhood-limited, and adolescent-onset trajectories exist and if these trajectories differ in developmental child- and environmental-level antecedents.

Surprisingly few longitudinal studies have investigated outcomes of CP trajectories in adolescence or adulthood. In fact, a meta-analysis on adult outcomes associated with the CP trajectories only included nine studies, showing that the three CP trajectories were at a higher risk of poor outcomes than the low CP trajectory (Bevilacqua et al., 2018). Meta-analytic findings, however, also indicated that childhood-persistent and adolescent-onset CP trajectories did not differ in risk for outcomes in adulthood (Bevilacqua et al., 2018). Longitudinal research on adolescent outcomes of CP trajectories is even more scarce. Existing work only compared the three CP trajectories with the low CP group in terms of maladjustment in adolescence (Heron et al., 2013). Studies that did include all relevant contrasts between the three CP trajectories merely considered concurrent features, instead of outcomes assessed at follow-up time points (e.g., Martins-Silva et al., 2024). Other studies scrutinized outcomes of joint trajectories of externalizing and internalizing problems (Fanti & Henrich, 2010), hampering a straightforward comparison with results from studies that solely focused on CP trajectories. Hence, additional longitudinal studies are needed to bolster what is known about the developmental outcomes of CP trajectories in adolescence.

Knowledge about antecedents and outcomes associated with different CP trajectories may help guide individualized prevention and intervention efforts designed for those at differential risk for CP. Unfortunately, in addition to the aforesaid limitations, past work also often used selected samples that were at high risk for CP (e.g., Cyr et al., 2022), underscoring the need for longitudinal research with non-selected community samples to facilitate generalizability of the findings. Moreover, earlier work typically relied on parents to estimate antecedents, CP trajectories, and outcomes (e.g., Barker & Maughan, 2009; Cyr et al., 2022). Thus, studies with multiple informants are required to avoid inflated correlations due to shared method variance. With a few notable exceptions (e.g., Sentse et al., 2017), studies that have identified the three CP trajectories predominantly originate from New Zealand, the USA, or the UK. Additionally, various publications have utilized data from the same sample, such as the Dunedin Multidisciplinary Health and Development Study (e.g., Odgers et al., 2007; Rivenbark et al., 2018), the Avon Longitudinal Study of Parents and Children (e.g., Barker & Maughan, 2009; Bauer et al., 2021), the Fast Track Project (Cyr et al., 2022; Goulter et al., 2021), or the 2004 Pelotas Birth Cohort Study (Martins-Silva et al., 2022, 2024). Thus, research on CP trajectories is needed with youngsters from other countries and study samples, especially because the degree to which certain behaviors are seen as problematic by parents and teachers might vary across countries (e.g., Thorell et al., 2018). Remarkably few studies examined if prospective associations between CP trajectories and future outcomes hold after controlling for other risk factors (but see: Cyr et al., 2022; Langevin et al., 2022; Woodward et al., 2002). Therefore, it remains highly uncertain if the identified CP trajectories differ in developmental outcomes after adjusting for other risk factors.

This study

The overall aim of the present study is to examine developmental antecedents and outcomes of CP trajectories, whilst addressing major limitations that hallmark prior research. Antecedents were selected because of their relevance for theory testing (e.g., Fairchild et al., 2013; Moffitt, 1993), understanding the development of CP (e.g., Frick, 2009; Salekin, 2016), and opportunities to facilitate comparison with earlier research (e.g., Gutman et al., 2019). In line with evidence that CP are one of the strongest signals of future impairment in important areas of functioning (Fairchild et al., 2019), we also selected developmental outcomes that covered a range of domains.

Specifically, the current investigation will use six waves of data from a Swedish longitudinal study of community-residing children. We aim to (*i*) identify teacher-rated CP trajectories starting from age 4–6 years (wave 2) to age 11–13 years (wave 5), (*ii*) test if early child- and environmental-level developmental antecedents (or risk factors) rated by teachers and parents at age 3–5 years (wave 1) are prospectively related to the identified CP trajectories, and (*iii*) investigate if the CP trajectories are predictive of teacher- and child-self-rated developmental outcomes assessed at age 14–16 years (wave 6). Child-level antecedents were chosen based on their theoretical relevance (e.g., fearless temperament and attention-deficit/hyperactivity), but also to enable comparison with prior work (e.g., non-ethnic minority). Additionally, we also selected child-level antecedents that have been deemed relevant for understanding the development of CP but were not included in past research on CP trajectories, including callous-unemotional (e.g., Frick, 2009), grandiose-deceitful (e.g., Salekin, 2016), and daring-impulsive (Bai & Lee, 2017) traits. Similarly, environmental-level antecedents (e.g., low SES, harsh parenting, and parental mental health problems) were selected for their theoretical significance and relevance to existing literature. Importantly, we selected developmental outcomes that covered a range of domains, enabling us to examine if CP trajectories show varying patterns in antisocial (e.g., bullying, rule breaking at school, and delinquency), social (i.e., low prosocial behavior and limited prosocial emotions), mental health (i.e., affective and anxiety problems), and educational (i.e., poor academic performance) outcomes. Crucially, developmental research showed that exposure to multiple risk factors have worse developmental consequences than single risk exposures (e.g., Evans et al., 2013). Thus, we also tested if cumulative child-level and/or environmental-level risk predicts CP trajectories, an issue that has rarely been addressed when studying developmental antecedents of CP trajectories (but see Gutman et al., 2019).[1]

In line with prior work (e.g., Barker et al., 2010) and theory (Fairchild et al., 2013), we anticipated at least four distinct CP trajectories, including low, childhood-persistent, childhood-limited, and adolescent-onset trajectories of CP. Given the scarcity of research and mixed findings, we proceeded without firm hypotheses about the developmental antecedents and outcomes of the CP trajectories. Yet, we expected that quantitative differences will emerge between the identified trajectories in terms of singular and cumulative child- and environmental-level risk factors, as well as developmental outcomes (Fairchild et al., 2013). However, we

[1]Gutman et al. (2019) examined CP trajectories (age 3 to 14 years) and used child-level (e.g., low verbal ability) and environmental-level (e.g., large family and non-intact family) features to create child cumulative and environmental cumulative risk indices. Crucially, this study only contrasted the three main CP groups of interest with the low CP group and did not test if cumulative risk was prospectively predictive of later CP trajectories.

https://doi.org/10.1017/S0954579424001949 Published online by Cambridge University Press

did not rule out the possibility that childhood-persistent and adolescent-onset CP trajectories might not differ in outcomes in adolescence (Moffitt, 2018).

Method

Participants and procedure

We used data from the ongoing longitudinal Swedish Social and Physical Development, Interventions and Adaption (SOFIA) study, which aimed to include all 2,542 children born between 2005 and 2007 and attending preschools in 2010 in a Swedish municipality. The six waves of data collection were conducted in 2010 (wave 1, ages 3–5 years), 2011 (wave 2, ages 4–6 years), 2012 (wave 3, ages 5–7 years), 2015 (wave 4, ages 8–10 years), 2018 (wave 5, ages 11–13 years), and 2021 (wave 6, ages 14–16 years). For 2,121 (47% girls) children, parents gave active consent to their child's participation in the study. Teacher and/or parent ratings were available for all six waves, while children also completed self-report questionnaires in waves 5 and 6. The SOFIA study has been evaluated and approved by a regional ethics committee. The study has followed all stipulated ethical research principles by the Swedish Research Council and the Swedish Ethics Authority. For details about participants and procedures, see Supplement 1, available online.

Measures

Details for all measures can be retrieved from Supplement 2. Here, we provide some information about the measure used to identify the trajectories and developmental antecedents and outcomes. We also report descriptive information and Cronbach's alpha (α) and mean inter-item correlation (MIC) as indices of the internal consistency of the scores.[2]

Measures – conduct problem trajectories (waves 2 to 5)

Teachers rated 10 conduct problems items at waves 2 to 5 that are closely based on *DSM-IV* criteria for conduct and oppositional defiant disorder (e.g., "*Has threatened someone*"; "*Has been in conflicts with adults*"; "*Has hit, scratched, pushed, kicked, or thrown something at others without apparent reason*"; and "*Has been very angry*"). These items were scored using a 5-point response scale ranging from 1 (= *Never*) to 5 (= *Very often*). We calculated the mean score of the ten items for each wave. The *M*(SD) was 1.65 (.70) for wave 2; 1.56 (.72) for wave 3; 1.35 (.61) for wave 4, and 1.28 (.52) for wave 5. Across the four waves, α ranged from .93 to .95 and MIC from .60 to .69.

Measures – developmental antecedents (wave 1)

Child-level risk factors. Teachers and parents rated the aforesaid 10 items tapping conduct problems [Teachers: *M*(SD) 1.71 (.69); α/MIC = .93/.57; Parents: *M*(SD) 1.89 (.49); α/MIC = .83/.33]. Teachers also completed the 6-item Child Fearlessness Scale [Colins et al., 2014; e.g., "*He/she does not seem to be afraid of anything*"; *M*(SD) 1.46 (.55); α/MIC = .89/.58] and the 28 items of the Child Problematic Traits Inventory (CPTI, Colins et al., 2014), a well-established questionnaire designed to measure grandiose-deceitful (eight items; e.g., "*Thinks that he/she is better than everyone on almost everything*"; *M*(SD) 1.24 (.40); α/MIC = .91/.56), callous-unemotional [10 items; e.g., "*Never seems to have a bad conscience for things that he or she has done*"; *M*(SD) 1.47 (.57); α/MIC = .95/.64], and impulsivity-need for stimulation [10 items; e.g., "*Seems to do certain things just for the thrill of it*"; *M*(SD) 1.76 (.62); α/MIC = .92/.54] in 3- to 12-year-olds (Colins et al., 2014). Symptoms of attention-deficit/hyperactivity disorder (ADHD) were assessed by teachers using the 18-item DuPaul's ADHD scale [DuPaul et al., 1998; *M*(SD) 1.99 (.73); α/MIC = .96/.56)]. The age (in months; *M*(SD) = 46.53 (10.33)] and origin of the child were based on parent reports. Children for whom none of the parents were born in Sweden (n = 333, 17.7%) were considered to be of Non-Swedish descent (0 = *Swedish*; 1 = *Non-Swedish*).

Environmental-level risk factors. The socioeconomic status (SES) of the family was assessed via questions to the parents about their level of education and about their yearly income. Parents also reported about the family composition and the number of (step) siblings of the child to determine if the child lives in an (non-) intact, and large family. In line with prior work on CP trajectories (Gutman et al., 2019) children were considered to live in a non-intact family (n = 226, 12.0 %) if both biological parents of the child no longer lived together (0 = *Intact Family*; 1 = *Non-intact family*) and in a large family (n = 157, 8.3%) if they had three or more (step) siblings (0 = *Small family*; 1 = *Large family*). Parents who acknowledged having experienced multiple periods of sadness and depression in a row, assessed via one question (n = 154, 8.2%) were considered to have depressed feelings (0 = *Without depressive symptoms*; 1 = *With depressive symptoms*). Parents also rated seven items relating to harsh or negative parenting [e.g., yelling, name-calling, and physical aggression; *M*(SD) 1.28 (.30); α/MIC = .62/.26] and seven items about warm or positive parenting [e.g., engaging in activities with the child, praising the child, and expression their love for the child; *M*(SD) 4.28 (.43); α/MIC = .66/.26].

Cumulative risk. In line with prior work about child development in general (Evans et al., 2013) and CP trajectories specifically (Gutman et al., 2019), we calculated cumulative risk by dichotomizing dimensionally assessed child-level and environmental-level risk factors (0 = *No risk*; 1 = *Risk*). Consistent with past work (e.g., Fontaine et al., 2011) and the approach that will be used to dichotomize developmental outcomes in wave 6 (infra), we used the 90th percentile cutoff to define children with low (0 = *No risk*) and high (1 = *Risk*) levels of seven wave 1 child-level risk factors (being parent-rated CP, teacher-rated CP, fearlessness temperament, grandiose-manipulative traits, callous-unemotional traits, impulsivity-need for stimulation, and ADHD symptoms) and one wave 1 environmental-level risk factor (i.e., harsh parenting). Next, we used the 10th percentile cutoff to define low levels of two wave 1 environmental-level risk factors, being low SES (0 = *No*; 1 = *Yes*) and low warm parenting (0 = *No*; 1= *Yes*). Then we summed nine child-level risk factors (i.e., the seven dichotomized scores, male gender, and non-Swedish ethnicity) to calculate cumulative child-level risk (theoretical and actual range = 0–9), and six environmental-level risk factors (i.e., the three dichotomized scores, non-intact family, large family, and parental depression) to calculate cumulative environmental-level risk (theoretical and actual range = 0–6). The sum of cumulative child- and environmental-level risk factors, finally, was calculated to index total cumulative risk (theoretical range: 0–15; actual range = 0–13).

[2]The α's can be interpreted as follows: <.60 = insufficient; .60 to .69 = marginal; .70 to .79 = acceptable; .80 to .89 = good; and ≥ .90 = excellent (Barker et al., 1994). Given that α depends on the number of items, we also calculated the MIC, which is independent of scale length and should be in the range of .15 to .50 to be considered acceptable (Clark & Watson, 1995).

https://doi.org/10.1017/S0954579424001949 Published online by Cambridge University Press

Measures – developmental outcomes (wave 6)

Teacher-rated outcomes. Teachers rated items from three DSM-oriented problem scales of the Teacher Report Form (TRF; Achenbach et al., 2001), being Conduct Problems [13 items; *M*(SD) 1.08 (.21); α/MIC = .89/.40], Affective Problems [eight items; *M*(SD) 1.16 (.29); α/MIC = .82/.34], and Anxiety Problems [six items; *M*(SD) 1.09 (.20); α/MIC = .69/.27]. Teachers also rated four items that tap the four criteria of the DSM-5 with limited prosocial emotion (LPE) specifier (Colins et al., 2021). In line with the DSM-5 (APA, 2013), children for whom two or more criteria were present were considered to meet criteria for the LPE specifier (n = 101, 5.4%; α/MIC = .85/.61). Next, teachers scored four items that tap prosocial behavior (e.g., "*Helping out at school in different ways*"), which were rescored to identify children with low levels of prosocial behavior (n = 103, 6.9%; α/MIC = .90/.72). Teachers also rated four items about the participants' academic performance and these items too were rescored to index poor academic performance (n = 129, 8.6%; α/MIC = .72/.36).

Child self-rated outcomes. Children rated items from the DSM-oriented Affective Problems [12 items; *M*(SD) 1.40 (.38); α/MIC = .84/.31] and the Anxiety Problems [six items; *M*(SD) 1.89 (.65); α/MIC = .86/.51] scales of the Youth Self-Report (YSR; Achenbach et al., 2001), along with two items from the Olweus Bully/Victim Questionnaire to identify children who bullied others (n = 144, 10.1%; Olweus, 1996). Children who broke rules were identified by means of two descriptions about rule-breaking behavior at school (n = 147, 10.5%). Children also answered one question that asked them whether they had been drunk in the last year (n = 154, 10.9%). Children, finally, completed 17 items about different forms of delinquent behaviors they have committed in the past six months [*M*(SD) 0.89 (1.69); α/MIC = .78/.29] and five questions about delinquent friends [*M*(SD) 1.26 (.31); α/MIC = .78/.42].

Data-analyses

General Growth Mixture Modeling (GGMM) in Mplus 8 (Muthén & Muthén, 2010) was used to identify distinct groups of individual trajectories for CP. GGMM identifies multiple classes by modeling the relationship between an attribute, in this case CP and age, which allows for cross-class differences in the shape of developmental trajectories. To retain children with incomplete assessments in the analysis, full information maximum likelihood fitting was used in the Mplus software. The GGMM estimation in Mplus results in two outputs: (1) the shape and location of the different estimated class trajectories, and (2) the posterior probability of class membership. Based on (Nagin & Tremblay, 2001), when inspection of the graphs suggests that a model with more classes indicates the existence of similar classes of small theoretical importance, the model with fewer and distinct classes is preferred. The average posterior probabilities and the entropy value are also taken into consideration to check for the precision of classification and the degree to which the classes are distinguishable. Average probabilities equal to or greater than .70 imply satisfactory fit (Nagin, 2005), and entropy values greater than .70 indicate clear classification and greater power to predict class membership (Muthén, 2000). Additionally, since more than three data points were available, both linear (i.e., testing whether individuals progress along an increasing or decreasing straight line) and quadratic growth (i.e., U-shaped or inversed U-shaped change over time) terms were investigated, which allows for a better description of developmental trajectories (i.e., linear and non-linear) (Ram & Grimm, 2007). Ram and Grimm (2007) suggested to use such growth functions in GGMM that match the developmental process under investigation, and according to existing theoretical accounts it is possible that some children might show limited change during childhood, followed by a curvilinear pattern of change especially as they approach adolescence (Moffitt, 1993).

Next, multinomial logistic regression (MNLR) analyses were used to identify developmental antecedents (or risk factors) that discriminate between the identified CP trajectories. In a series of unadjusted MNLR analyses, only one singular child-level or environmental-level dichotomized risk factor or the cumulative risk index was entered as predictor in the model. Next, in a series of adjusted analyses, dichotomized parent-rated and teacher-rated CP (wave 1; not used to identify CP trajectories) were added to the unadjusted models. Controlling for wave 1 CP is important because dichotomized wave 1 CP was significantly related with other wave 1 risk factors (Table S1). Hence, it must be tested if relations between child-level and environmental-level risk factors and CP trajectory membership are not driven by wave 1 CP. Also, because the cumulative risk indices were based on the sum of dichotomized scores, dichotomized (instead of dimensional) singular child- and environmental-level risk factors were used as predictors in the MNLR analyses. Odds ratio's (OR), with 95% confidence intervals (CI) were calculated to express longitudinal relations between risk factors and trajectory membership. Unadjusted and adjusted (including wave 1 CP as a control variable) MNLR analyses were performed repeatedly, using three different reference groups, being (*i*) low CP, (*ii*) childhood-limited CP, and (*iii*) adolescent-onset CP trajectories.

Finally, to deal with skewness (range from 0.86 to 4.00) and kurtosis (range from 0.07 to 24.66; details available upon request) of continuously measured wave 6 outcomes, all continuous outcomes were first dichotomized using the 90th percentile scores. Then logistic regression (LR) analyses were performed, using trajectory membership as predictor of the outcomes (i.e., "unadjusted model"). To test if CP trajectories are predictive of the outcomes after controlling for risk factors that were assessed at wave 1, we also report findings from LR analyses that adjusted for total wave 1 cumulative risk ("adjusted model"). Associations were expressed as OR with 95% CI. For the planned comparisons, the reference group of the trajectory membership variable was changed were needed.

All analyses were performed using SPSS 27, with $p < .05$ as an indicator of statistical significance, unless otherwise specified. The number of children that was included in the study varied across the analyses. Therefore, sufficient information is provided where needed to determine how many participants were included in the analyses. Information about missing data and attrition analyses can be retrieved from Supplement 3.

Results

Developmental trajectories of conduct problems (N = 2,045)

To identify the optimal number of trajectories for CP, models with one to five classes (in line with previous research) were estimated in the total sample. The BIC statistic increased from Class 4 (BIC = 10,599.75) to Class 5 (BIC = 11,073.22) and the LMR statistic fell out of significance for the 5-class model, suggesting that the 4-class model better represented the data. Moreover, the 5-class model indicated the existence of two very similar

https://doi.org/10.1017/S0954579424001949 Published online by Cambridge University Press

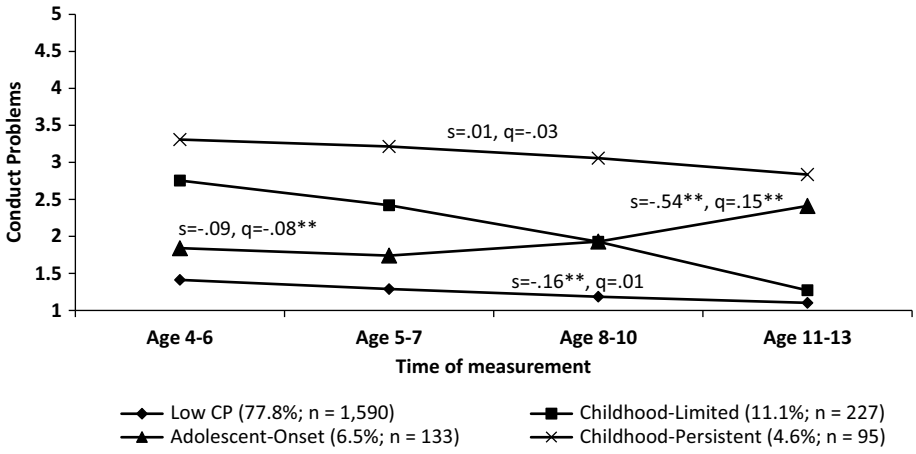

Figure 1. The four identified trajectories of teacher-rated conduct problems in the total sample ($N = 2{,}045$) via general growth mixture modeling (s = slope; q = quadratic).

trajectories of small theoretical importance. Thus, the more parsimonious 4-class model was selected (Figure 1). The mean probability score for the four CP classes ranged from .80 to .98 and the entropy value was .92, suggesting that the classes were well separated. The quadratic model better fit the data compared to the linear model. The four CP trajectories identified with the GGMM analysis are shown in Figure 1. Children assigned to the low CP trajectory (54.1% females) exhibited low CP across all four waves. As shown in Figure 1, only the linear intercept was significant for the low CP trajectory group, indicating that on average levels of CP decreased over time in a linear way. Children in the childhood-persistent trajectory (13.7% females) scored above average levels of CP across time, with no significant change across the four time points since both growth terms were non-significant. Children in the childhood-limited trajectory (22.9% females) showed a curvilinear decrease in CP across time, with the higher decrease observed from Time 2 to Time 4. In contrast, children in the adolescent-onset trajectory (24.8% females) showed a linear decrease from wave 1 to wave 2, and a curvilinear increase in CP from wave 2 to wave 4 (both linear and quadratic growth terms were significant), suggesting that the higher levels of CP were evident during adolescence. All groups but one (i.e., low CP) were highly over-represented by males. The four trajectories were significantly different in CP at each wave, with the exception that the childhood-limited and adolescent-onset trajectory did not differ in level of CP at wave 4, see Table S2 for details.

Developmental antecedents of the trajectories of conduct problems (N = 1,882)

Table 1 presents descriptive information for the teacher- and parent-rated wave 1 (age 3–5 years) dichotomized developmental antecedents for the four trajectories.

Child-level risk factors. Table 3S shows that dichotomized teacher-rated CP was a robust predictor of CP trajectory membership across all comparisons and that dichotomized parent-rated CP was only predictive of childhood-limited (vs. low) and childhood-persistent (vs. low and adolescent-onset) CP trajectories. Table 2 shows that with the exception of age and non-Swedish origin all singular child-level risk factors other than wave 1 CP and cumulative child-level risk increased the likelihood of being in the childhood-persistent, childhood-limited, and adolescent-onset CP trajectory, relative to the low CP trajectory. Findings remained substantially similar after controlling for wave 1 conduct problems (Table 2). In addition, children with callous-unemotional (CU) traits, ADHD features, and a higher cumulative child-level risk were less likely to be classified in the adolescent-onset, relative to the childhood-limited CP trajectory, though these three features no longer were significant risk factors after controlling for wave 1 conduct problems (Table 2). Fearless temperament, CU traits, impulsivity-need for stimulation, and cumulative child-level risk were predictive of being in the childhood-persistent CP trajectory, relative to the childhood-limited and adolescent-onset CP trajectories, whereas grandiose-deceitfulness and ADHD features predicted the childhood-persistent, relative to the adolescent-onset CP trajectory. Yet, after controlling for wave 1 CP, a childhood-persistent classification was only significantly predicted by fearlessness (vs. childhood-limited) and CU traits (vs. adolescent-onset).

Environmental-level risk factors. As shown in Table 3, low SES, non-intact family, and harsh parenting, and cumulative environmental-level risk were predictive of childhood-limited and childhood-persistent, relative to low trajectory membership. After controlling for wave 1 CP, all but one of these aforesaid risk factors (i.e., harsh parenting) remained significantly associated with childhood-limited and childhood-persistent (vs. low) CP trajectories (Table 3). Parental depression increased the likelihood of being in the childhood-limited (vs. low) trajectory of CP, a finding that was unchanged when controlling for wave 1 CP. Children in the adolescent-onset CP trajectory did not differ in any singular risk factor from their counterparts in the low and childhood-limited CP trajectories, though children with a higher cumulative environmental-level risk were more likely to be classified in the adolescent-onset than in the low CP trajectory, also after controlling for wave 1 CP. Children from a non-intact family were at in increased risk of being in the childhood-persistent trajectory, relative to the childhood-limited and adolescent-onset CP trajectories, also after controlling for wave 1 CP. Table 3, finally, shows that children from low SES families and higher cumulative environmental risk had a higher likelihood of being in the childhood-persistent than in the adolescent-onset CP trajectory, but both significant associations disappeared after controlling for wave 1 CP.

Unique effects of child- and environmental-level risk. Table 4 reports findings from analyses that examined the prognostic usefulness of cumulative child- and cumulative environmental-level risk, after controlling for their overlap. As shown in Table 4,

https://doi.org/10.1017/S0954579424001949 Published online by Cambridge University Press

Table 1. Comparisons between the conduct problems trajectories on dichotomized potential developmental antecedents assessed at wave 1 (age 3–5 years; $N = 1,882$)

	Conduct Problem Trajectories			
	Low ($n = 1,483$)	Childhood-Limited ($n = 197$)	Adolescent-Onset ($n = 120$)	Childhood-Persistent ($n = 82$)
Child-level risk factors	*N* (%)	*N* (%)	*N* (%)	*N* (%)
Age (in months) [*M*(SD)]	46.8 (10.3)	45.8 (10.3)	45.6 (10.5)	45.3 (9.7)
Male gender (*p*)	678 (45.7)	152 (77.2)	90 (75.0)	70 (85.4)
Non-Swedish origin (*p*)	238 (16.1)	45 (22.8)	33 (27.5)	17 (20.7)
Conduct problems (*p*)	120 (8.1)	41 (20.8)	15 (12.5)	24 (29.3)
Conduct problems (*t*)	75 (5.1)	74 (37.6)	21 (17.5)	48 (58.5)
Fearless temperament (*t*)	66 (4.5)	43 (21.8)	17 (14.2)	34 (41.5)
Grandiose-deceitful (*t*)	122 (8.2)	46 (23.4)	23 (19.2)	28 (34.1)
Callous-unemotional (*t*)	97 (6.5)	57 (28.9)	15 (12.5)	39 (47.6)
Impulsive-need for stimulation (*t*)	81 (5.5)	52 (26.4)	21 (17.5)	37 (45.1)
Attention-deficit/hyperactivity symptoms (*t*)	74 (5.0)	60 (30.5)	20 (16.7)	35 (42.7)
Environmental-level risk factors	*N* (%)	*N* (%)	*N* (%)	*N* (%)
Low SES (*p*)	116 (7.8)	34 (17.3)	15 (12.5)	19 (23.2)
Harsh parenting (*p*)	136 (9.2)	30 (15.2)	17 (14.2)	14 (17.1)
Low warm parenting (*p*)	114 (7.7)	17 (8.6)	11 (9.2)	8 (9.8)
Non-intact family (*p*)	141 (9.5)	38 (19.3)	18 (15.0)	29 (35.4)
Large family size (*p*)	118 (8.0)	21 (10.7)	10 (8.3)	8 (9.8)
Parental depressive symptoms (*p*)	106 (7.2)	29 (14.7)	14 (11.7)	5 (6.1)
Cumulative risk	*M*(SD)	*M*(SD)	*M*(SD)	*M*(SD)
Child-level cumulative risk	1.04 (1.17)	2.89 (2.04)	2.12 (1.48)	4.05 (2.51)
Environmental-level cumulative risk	0.49 (0.76)	0.86 (0.95)	0.71 (0.89)	1.01 (0.96)
Total cumulative risk	1.54 (1.46)	3.75 (2.33)	2.83 (1.82)	5.06 (2.88)

Note. *p* = parent-rated; *t* = teacher-rated.

cumulative child-level risk as well as total cumulative risk (*i*) increased the risk of being in the childhood-limited, adolescent-onset, and childhood-persistent (vs. low) CP trajectories, (*ii*) increased the risk of being in the childhood-persistent (vs. the childhood-limited and adolescent-onset) CP trajectory, but (*iii*) decreased the likelihood of being classified in the adolescent-onset (vs. childhood-limited) CP trajectory. Cumulative environmental-level risk only was predictive of childhood-limited, adolescent-onset, and childhood-persistent trajectory membership when using low CP as reference group.

Trajectories of conduct problems and developmental outcomes in adolescence

Table 5 summarizes the percentages of children who exhibit the teacher- and child self-rated developmental outcomes across the four trajectory groups. Wave 1 total cumulative risk was significantly associated with all teacher-rated outcomes (Table S4) and all but one of the child self-reported outcomes (i.e., affective problems; Table S5).

Teacher-rated outcomes. Table 6 demonstrates that children in the childhood-persistent CP trajectory were at a higher risk for all six outcomes than children in the other three CP trajectories. After controlling for wave 1 total cumulative risk, all aforesaid prospective associations remained significant, with three exceptions, being that children in the childhood-persistent and adolescent-onset CP trajectories did no longer differ in their risk to exhibit anxiety problems, limited prosocial emotions, and low prosocial behavior (Table 6). Children in the adolescent-onset trajectory were at an increased risk for conduct problems, limited prosocial emotions, and low prosocial behavior, relative to children in the low and childhood-limited CP trajectories, and to show poorer academic achievement, relative to children in the low CP trajectory. These findings were unchanged when controlling for wave 1 total cumulative risk, with two notable exceptions: children in the adolescent-onset (vs. low) CP trajectory were no longer at a higher risk for poor academic performance and were more likely to exhibit affective problems. Children in the childhood-limited CP trajectory, finally, were more likely to display conduct problems and low prosocial behavior than those in the low CP trajectory. When controlling for wave 1 total cumulative risk, one of the latter two prospective associations (i.e., low prosocial behavior) became non-significant, whilst children in the childhood-limited (vs. low) CP trajectory also were at a higher risk of showing affective problems and limited prosocial emotions (Table 6).

Child self-rated outcomes. Few significant prospective associations between CP trajectories and child self-rated developmental

https://doi.org/10.1017/S0954579424001949 Published online by Cambridge University Press

Table 2. Unadjusted and adjusted associations between dichotomized potential child antecedents assessed at wave 1 (age 3–5 years) and conduct problems trajectories tested with multinominal regression analyses ($N = 1,882$)

	Pairwise Comparisons Between CP Trajectories					
	CH-Limited (vs Low)	Adolescent-Onset (vs Low)	CH-Persistent (vs Low)	Adolescent-Onset (vs CH-Limited)	CH-Persistent (vs CH-Limited)	CH-Persistent (vs Adolescent-Onset)
Singular Child-Level Risk Factors	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Age (*p*)	0.99 (0.98; 1.01)	0.99 (0.97; 1.01)	0.99 (0.96; 1.01)	1.01 (0.99; 1.02)	1.00 (0.97; 1.02)	0.99 (0.97; 1.02)
Male gender (*p*)	**4.01** (2.83; 5.68)*	**3.56** (2.33; 5.45)*	**6.93** (3.72; 12.89)*	0.89 (0.52; 1.51)	1.73 (0.86; 3.47)	1.94 (0.93; 4.07)
Non-Swedish origin (*p*)	**1.55** (1.08; 2.22)*	**1.98** (1.30; 3.03)*	1.37 (0.78; 2.37)	1.28 (0.76; 2.16)	0.88 (0.47; 1.66)	0.69 (0.35; 1.34)
Fearless temperament (*t*)	**5.99** (3.94; 9.11)*	**3.54** (2.00; 6.26)*	**15.21** (9.19; 25.17)*	0.59 (0.32; 1.09)	**2.54** (1.45; 4.42)*	**4.29** (2.19; 8.43)
Grandiose-deceitful (*t*)	**3.40** (2.33; 4.96)*	**2.64** (1.62; 4.32)*	**5.78** (3.53; 9.47)*	0.78 (0.44; 1.36)	1.70 (0.97; 2.99)	**2.19** (1.15; 4.17)
Callous-unemotional (*t*)	**5.82** (4.02; 8.43)*	**2.04** (1.14; 3.64)	**12.96** (8.02; 20.94)*	**0.35** (0.19; 0.65)	**2.23** (1.31; 3.79)	**6.35** (3.17; 12.70)*
Impulsivity-need for stimulation (*t*)	**6.21** (4.21; 9.15)*	**3.67** (2.18; 6.18)*	**14.23** (8.72; 23.21)*	0.59 (0.33; 1.04)	**2.29** (1.34; 3.93)	**3.88** (2.04; 7.36)
ADHD symptoms (*t*)	**8.34** (5.69; 12.23)*	**3.81** (2.23; 6.50)*	**14.18** (8.63; 23.29)*	**0.46** (0.26; 0.81)	1.70 (0.99; 2.90)	**3.72** (1.94; 7.13)
Cumulative Child-Level Risk						
Total number of risk factors	**1.99** (1.82; 2.19)*	**1.66** (1.48; 1.86)*	**2.47** (2.19; 2.79)*	**0.83** (0.74; 0.93)	**1.24** (1.11; 1.39)	**1.49** (1.30; 1.71)

Note. In the unadjusted analyses one risk factor was included as predictor, in the adjusted analyses one risk factor was included together with the dichotomized teacher- and parent-rated conduct problems that were weakly but significantly positively correlated (.15, $p < .001$; see Table S1); All single child-level risk factors reported in this table along with teacher- and parent-rated conduct problems were used to calculate the cumulative risk (see Method); CH = Childhood; OR = odds ratio; CI = confidence interval; *p* = parent-rated; *t* = teacher-rated; ADHD = Attention-deficit/hyperactivity disorder symptoms; significant associations are in bold

*Remained significant after controlling for dichotomized wave 1 parent-rated and teacher-rated conduct problems (for details, see Supplementary Table S6).

Table 3. Unadjusted and adjusted associations between dichotomized potential environmental antecedents assessed at wave 1 (age 3–5 years) and conduct problems trajectories tested with multinominal regression analyses ($N = 1,882$)

	Pairwise Comparisons Between Trajectories of CP					
	CH-Limited (vs Low)	Adolescent-Onset (vs Low)	CH-Persistent (vs Low)	Adolescent-Onset (vs CH-Limited)	CH-Persistent (vs CH-Limited)	CH-Persistent (vs Adolescent-Onset)
Singular Environmental-Level Risk Factors	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Low SES (*p*)	**2.46** (1.62; 3.72)*	1.68 (0.95; 2.99)	**3.55** (2.06; 6.14)*	0.26 (0.36; 1.32)	1.45 (0.77; 2.72)	**2.11** (1.01; 4.45)
Non-intact family (*p*)	**2.28** (1.53; 3.37) *	1.68 (0.99; 2.85)	**5.21** (3.21; 8.46) *	0.74 (0.40; 1.36)	**2.29** (1.29; 4.07) *	**3.10** (1.58; 6.09) *
Large family (*p*)	1.38 (0.85; 2.53)	1.05 (0.54; 2.06)	1.25 (0.59; 2.66)	0.76 (0.35; 1.68)	0.91 (0.38; 2.14)	1.19 (0.45; 3.15)
Parental depressive symptoms (*p*)	**2.24** (1.44; 3.74) *	1.71 (0.95; 3.09)	0.84 (0.33; 2.12)	0.76 (0.39; 1.51)	0.38 (0.14; 1.01)[#]	0.49 (0.17; 1.42)
Harsh parenting(*p*)	**1.78** (1.16; 2.73)	1.63 (0.95; 2.81)	**2.04** (1.12; 3.72)	0.92 (0.48; 1.75)	1.15 (0.57; 2.30)	1.25 (0.58; 2.70)
Low warm parenting (*p*)	1.13 (0.66; 1.93)	1.21 (0.63; 2.32)	1.30 (0.61; 2.76)	1.07 (0.48; 2.37)	1.14 (0.47; 2.78)	1.07 (0.41; 2.79)
Cumulative Environmental-Level Risk						
Total number of risk factors	**1.63** (1.39; 1.91)*	**1.38** (1.12; 1.70)*	**1.88** (1.51; 2.33)*	0.85 (0.66; 1.08)	1.15 (0.90; 1.47)	**1.36** (1.03; 1.81)

Note. In the unadjusted analyses one antecedent was included as predictor of trajectory membership; In the adjusted analyses one antecedent was included together with dichotomized teacher-and parent-rated conduct problems; CH = Childhood; OR = odds ratio; CI = confidence interval; *p* = parent-rated; *t* = teacher-rated; significant associations are in bold

*Remained significant after controlling for dichotomized wave 1 teacher-and parent-rated conduct problems (see Supplementary Table S7)

[#]Became significant after controlling for dichotomized wave 1 teacher-and parent-rated conduct problems (for details see Supplementary Table S7)

Table 4. Unadjusted and adjusted associations between cumulative risk indices assessed at wave 1 (age 3–5 years) and conduct problems trajectories tested with multinominal regression analyses ($N = 1{,}882$)

	Pairwise Comparisons Between CP Trajectories					
	CH-Limited (vs Low)	Adolescent-Onset (vs Low)	CH-Persistent (vs Low)	Adolescent-Onset (vs CH-Limited)	CH-Persistent (vs CH-Limited)	CH-Persistent (vs Adolescent-Onset)
Model 1	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
Cumulative child-level risk	**1.96** (1.78; 2.15)*	**1.64** (1.46; 1.83)*	**2.42** (2.14; 2.73)*	**0.84** (0.74; 0.94)	**1.23** (1.10; 1.38)	**1.48** (1.29; 1.70)
Cumulative environmental-level risk	**1.43** (1.20; 1.71)*	**1.26** (1.01; 1.56)*	**1.58** (1.23; 2.02)*	0.88 (0.68; 1.13)	1.10 (0.85; 1.42)	1.26 (0.93; 1.46)
Model 2						
Total cumulative risk	**1.82** (1.67; 1.97)*	**1.53** (1.38; 1.68)*	**2.20** (1.98; 2.45)*	**0.84** (0.76; 0.93)	**1.21** (1.10; 1.34)*	**1.44** (1.28; 1.63)*

Note. Model 1 included the two cumulative risk indices as independent variables and, thus, tests the unique effects of cumulative child- and cumulative environmental-level risk; Model 2 includes one independent variable (i.e., Total cumulative risk), reflecting the sum of the cumulative child-level and cumulative environmental-level risk indices; CH = Childhood; OR = odds ratio; CI = confidence interval; significant associations are in bold.
*Remained significant after controlling for dichotomized wave 1 teacher-and parent-rated conduct problems (details available upon request)

outcomes were detected, and most often only when comparing children in three CP trajectories with children in the low CP trajectory (Table 7). Specifically, children in the childhood-limited, adolescent-onset, and childhood-persistent CP trajectories had a higher likelihood of delinquency, bullying, rule breaking at school, and having delinquent friends, relative to children in the low CP trajectory, also after controlling for wave 1 total cumulative risk (for two notable exceptions see Table 7). Relative to children in the low CP trajectory, children in the childhood-limited and childhood-persistent CP trajectories were at a lower risk for anxiety problems and at a higher risk of being drunk, respectively, though no longer when adjusting for wave 1 total cumulative risk. Relative to children in the childhood-limited CP trajectory, children in the adolescent-onset and childhood-persistent CP trajectories were at a higher risk for delinquency, and when controlling for wave 1 total cumulative risk, also for bullying and rule breaking at school (adolescent-onset) or DSM-oriented anxiety problems (childhood-persistent) (Table 7). Adolescent-onset and childhood-persistent CP trajectories did not differ in their risk for child self-rated developmental outcomes, whether or not total cumulative risk was included in the analyses (Table 7).

Discussion

This longitudinal study examined if differences emerged between CP trajectories in terms of both singular and cumulative early childhood risk factors, as well as in developmental outcomes in adolescence. The study provides novel evidence showing that certain child- and environmental-level developmental antecedents differentiate between children exhibiting different CP trajectories. Findings, overall, support the idea that differences between the three CP trajectories are quantitative rather than qualitative (Fairchild et al., 2013). Furthermore, our results also showed that the identified CP trajectories were associated with developmental outcomes during adolescence, even after controlling for cumulative risk in early childhood. Altogether, our findings underscore the importance of prevention efforts aiming to reduce conduct problems, both in childhood and adolescence.

Conduct problems trajectories

Four CP trajectories were identified in our Swedish community sample, with 77.8% of children never exhibiting CP (low CP), followed by children with elevated conduct problems only in childhood (childhood-limited; 11.1%) or adolescence (adolescent-onset; 6.5%), and children showing persistently high levels of conduct problems (childhood-persistent; 4.6%). These findings support the applicability of earlier established CP trajectories (e.g., Fairchild et al., 2013) in Sweden, although the percentages are slightly lower compared to most prior cohort studies, including the Dunedin Multidisciplinary Health and Development Study (i.e., childhood-limited = 22.0%; adolescent-onset = 18.7%; and childhood-persistent = 9.0%; Odgers et al., 2007), the Millennium Cohort Study (i.e., childhood-limited = 22.6.%; adolescent-onset = 12.4%; and childhood-persistent = 7.2%; (Gutman et al., 2019), and the Avon Longitudinal Study (i.e., childhood-limited = 14.7.%; adolescent-onset = 11.8%; and childhood-persistent = 9.2%; Barker & Maughan, 2009). Yet, whereas earlier work typically used parent reports or multiple informants, our CP trajectory analyses were only based on teacher-ratings. Although this was done to avoid same-reporter bias when studying the antecedents and outcomes of the CP trajectories, parents tend to

Table 5. Descriptive information for the conduct problems trajectories and the total sample on dichotomized developmental outcomes assessed at wave 6 (age 14–16 years)

	Trajectory Groups				
	Low	Childhood-Limited	Adolescent-Onset	Childhood-Persistent	Total Sample
Teacher-rated Dichotomized Outcomes	*N* (%)	*N* (%)	*N* (%)	*N* (%)	*N* (%)
DSM conduct problems (1,1219/156/101/57/1,533)	67 (5.5)	22 (14.1)	28 (27.7)	25 (43.9)	142 (9.3)
DSM affective problems (1,218/155/101/57/1,531)	94 (7.7)	18 (11.6)	13 (12.9)	18 (31.6)	143 (9.3)
DSM anxiety problems (1,219/154/101/571,531)	156 (12.8)	25 (16.2)	19 (18.8)	19 (33.3)	219 (14.3)
Limited prosocial emotions (1,201/154/99/56/1,515)	55 (4.6)	11 (7.1)	15 (15.2)	19 (33.9)	101 (6.7)
Low prosocial behavior (1,187/148/99/54/1,488)	68 (5.7)	9 (6.1)	13 (13.1)	13 (24.1)	103 (6.9)
Poor academic performance (1,189/153/100/53/1,495)	81 (6.8)	14 (9.2)	14 (14.0)	20 (37.7)	129 (8.6)
Child Self-rated Dichotomized Outcomes					
Delinquency (1,084/145/83/44/1,356)	103 (9.5)	14 (9.7)	18 (21.7)	12 (27.3)	147 (10.8)
Bullying (1,140/148/86/47/1,421)	88 (7.7)	23 (15.5)	21 (24.4)	12 (25.5)	144 (10.1)
Rule breaking at school (1,127/146/87/46/1,406)	93 (8.3)	21 (14.4)	21(24.1)	12 (26.1)	147 (10.5)
Being drunk (1,137/148/86/47/1,418)	114 (10.0)	17 (11.5)	13 (15.1)	10 (21.3)	154 (10.9)
DSM affective problems (1,136/149/86/47/1,418)	100 (8.8)	8 (5.4)	8 (9.3)	6 (12.8)	122 (8.6)
DSM anxiety problems (1,134/149/86/47/1,416)	135 (11.9)	8 (5.4)	10 (11.6)	6 (12.8)	159 (1,416)
Delinquent friends (1,121/147/86/46/1,400)	110 (9.8)	25 (17.0)	17 (19.8)	46 (28.3)	165 (11.8)

Note. The numbers between parentheses that are displayed next to the outcome variable name refer to the numbers of children who are included in the low, childhood-limited, adolescent-onset, and childhood-persistent conduct problems trajectories and in the total sample for whom outcome data were available; DSM = DSM-oriented problem scale.

rate their children as having considerably more CP than do teachers (e.g., Rescorla et al., 2014). Still, it is unlikely that the sole reliance on teacher-reports explains the lower percentages of children in the three CP trajectories, especially since our percentages align closely with those reported in the 2004 Pelotas Birth Cohort study that only used maternal reports (i.e., childhood-limited = 17.7.%; adolescent-onset = 7.3%; and childhood-persistent = 3.8%; Martins-Silva et al., 2022). Regardless of possible cross-country or informant variations, our findings suggest that most children who started displaying CP in childhood do no longer continue their CP in adolescence (Fairchild et al., 2013). Specifically, in our study, 70% of the 322 children who started displaying CP in childhood were classified in the childhood-limited trajectory, a percentage that dovetails with the 50%–70% estimate reported earlier (Fairchild et al., 2013). Furthermore, findings indicate that children who started off at similarly low levels as the low CP trajectory can still display high levels of conduct problems in adolescence.

Developmental antecedents of conduct problems trajectories

Overall, we showed that most singular child-level risk factors were predictive of the three CP trajectories, relative to the low CP trajectory, also after controlling for wave 1 conduct problems. The finding that callous-unemotional traits put children at an increased risk to be on the childhood-persistent and childhood-limited trajectories confirms that CU traits is a risk factor for severe conduct problems (Frick et al., 2014; Frick, 2022). Evidence that callous-unemotional traits predicted future severe and stable conduct problems independent of baseline conduct problems has been interpreted as support for using CU traits as a specifier for conduct problems (e.g., Frick, 2021). However, two additional psychopathic traits, grandiose-deceitfulness and impulsivity-need for stimulation, were also found to be risk factors of childhood-limited and childhood-persistent trajectories, independent of baseline conduct problems. This supports recent recommendations to consider these two child-level features as additional specifiers for conduct problems (Salekin, 2022). Three of the six singular environmental-level risk factors (i.e., low SES, non-intact family, and parental depressive symptoms) were predictive of the childhood-limited and/or childhood-persistent CP trajectories, when compared to the low CP trajectory, independent of wave 1 conduct problems of the child. This corroborates prior evidence that low SES, and broken family, parental mental health problems are associated with conduct problems (e.g., Connell & Goodman, 2002; Deater–Deckard et al., 1998).

To test if childhood- and adolescent-onset CP are predicted by different child- and environmental-level risks (Moffitt, 1993, 2018), childhood-persistent and adolescent-onset CP trajectories were compared in wave 1 risk factors. In line with the theory, both child-level (i.e., fearlessness, grandiose-deceitfulness, callous-unemotional traits, impulsivity-need for stimulation, and ADHD symptoms) and environmental-level (i.e., low SES and non-intact family) risk factors increased the likelihood of being classified in the childhood-persistent trajectory. We could not confirm that children in the childhood-persistent (vs. adolescent-onset) CP trajectory experienced more harsh and less warm parenting (Moffitt, 2018) or parental depression (Barker & Maughan, 2009). Nevertheless, when controlling for wave 1 conduct problems all but two (i.e., callous-unemotional traits and non-intact family) risk factors were no longer significantly associated with childhood-persistent CP. This indicates that most differences between the childhood-persistent and adolescent-onset CP trajectories diminish when accounting for baseline conduct problems. Findings also converge with past work

https://doi.org/10.1017/S0954579424001949 Published online by Cambridge University Press

Table 6. Comparisons between conduct problems trajectories and teacher-rated developmental outcomes (age 14–16 years) tested with logistic regression analyses

	DSM Conduct Problems (yes: $n = 142$)	DSM Affective Problems (yes: $n = 143$)	DSM Anxiety Problems (yes: $n = 219$)	Limited Prosocial Emotions (yes: $n = 101$)	Low Prosocial Behavior (yes; $n = 103$)	Poor Academic Performance (yes: $n = 129$)
Contrast 1:	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
CH-LIM (vs. Low)	**2.82** (1.69; 4.72)*	1.57 (0.92; 2.68)#	1.32 (0.83; 2.09)	1.58 (0.81; 3.08)#	**1.79** (1.24; 2.57)	1.39 (0.76; 2.50)
AO (vs. Low)	**6.59** (4.00; 10.88)*	1.78 (0.95; 3.28)#	1.58 (0.93; 2.67)	**3.68** (1.99; 6.58)*	**4.42** (2.91; 6.73)*	**2.23** (1.21; 4.09)
CH-PER (vs. Low)	**13.43** (7.53; 23.95)*	**5.52** (3.04; 10.02)*	**3.41** (1.92; 6.06)*	**10.54** (5.70; 19.50)*	**10.71** (5.65; 20.28)*	**8.29** (4.55; 15.10)*
Contrast 2:						
AO (vs. CH-LIM)	**2.34** (1.25; 4.37)*	1.12 (0.53; 2.41)	1.12 (0.62; 2.31)	**2.32** (1.02; 5.29)*	**2.48** (1.47; 4.18)*	1.61 (0.73; 3.56)
CH-PER (vs. CH-LIM)	**4.76** (2.39; 9.49)*	**3.51** (1.67; 7.39)*	**2.58** (1.28; 5.18)*	**6.68** (2.92; 5.25)*	**6.00** (2.95; 12.20)*	**6.02** (2.75; 13.14)*
Contrast 3:						
CH-PER (vs. AO)	**2.04** (1.03; 4.02)*	**3.12** (1.39; 7.00)*	**2.16** (1.03; 4.54)	**2.88** (1.32; 6.27)	**2.42** (1.16; 5.07)	**3.72** (1.69; 8.22)*
(n included in the analyses)	($n = 1,533$)	($n = 1,531$)	($n = 1,531$)	(1,515)	($n = 1,488$)	($n = 1,495$)

Note. The n for yes in the column headings refers to the number of participants who exhibited high levels of the outcomes; In the unadjusted analyses only trajectory membership was included as the predictor; In the adjusted analyses trajectory membership and wave 1 total cumulative risk (i.e., sum of the number of child- and environmental-level risk factors) were used as the predictor. Low = Low CP; CH-LIM = Childhood-Limited CP; AO = Adolescent-Onset CP; CH-PER = Childhood-Persistent CP; DSM = DSM-oriented; OR = odds ratio; 95% CI = confidence interval; significant associations are in bold.

*Remained significant after controlling for the total number of risk factors (details can be retrieved from Supplementary Table S8)

#Became significant after controlling for total cumulative risk (details can be retrieved from Supplementary Table S8).

Table 7. Comparisons between trajectories and child self-rated developmental outcomes (age 14–16 years) tested with logistic regression analyses

	Delinquency (yes: $n = 147$)	Bullying (yes; $n = 144$)	Rule Breaking At School (yes: $n = 147$)	Being Drunk (yes: $n = 154$)	DSM Affective Problems (yes: $n = 122$)	DSM Anxiety Problems (yes: $n = 159$)	Delinquent Friends (yes: $n = 165$)
Contrast 1:	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)	OR (95% CI)
CH-LIM (vs. Low)	**1.02** (0.56; 1.83)	**2.20** (1.34; 3.61)*	**1.87** (1.12; 3.11)	1.16 (0.68; 2.00)	0.59 (0.28; 1.23)	**0.42** (0.20; 0.88)	**1.88** (1.17; 3.02)*
AO (vs. Low)	**2.64** (1.51; 4.62)*	**3.86** (2.25; 6.16)*	**3.54** (2.07; 6.04)*	1.60 (0.86; 2.97)	1.06 (0.50; 2.26)	0.97 (0.49; 1.93)	**2.26** (1.29; 3.99)*
CH-PER (vs. Low)	**3.57** (1.51; 4.62)*	**4.10** (2.05; 8.18)*	**3.92** (1.97; 7.83)*	**2.43** (1.17; 5.01)	1.52 (0.63; 3.66)	1.08 (0.45; 2.60)	**3.62** (1.85; 7.09)*
Contrast 2:							
AO (vs. CH-LIM)	**2.59** (1.21; 5.54)*	1.76 (0.91; 3.41)[#]	1.89 (0.97; 3.72)[#]	1.37 (0.63; 2.98)	1.81 (0.65; 5.00)	2.32 (0.88; 6.12)	1.20 (0.61; 2.38)
CH-PER (vs. CH-LIM)	**3.51** (1.48; 8.31)*	1.86 (0.84; 4.11)	2.10 (0.94; 4.69)	2.08 (0.88; 4.93)	2.58 (0.85; 7.86)	2.58 (0.85; 7.86)[#]	1.92 (0.89; 4.16)
Contrast 3:							
CH-PER (vs. AO)	1.35 (0.58; 3.15)	0.89 (0.47; 2.41)	1.1 (0.49; 2.52)	1.52 (0.61; 3.79)	1.43 (0.46; 4.39)	1.11 (0.38; 3.28)	1.60 (0.70; 3.68)
(n included in the analyses)	($n = 1,356$)	($n = 1,421$)	($n = 1,406$)	($n = 1,418$)	($n = 1,418$)	($n = 1,416$)	($n = 1,400$)

Note. The number of participants who exhibited high or low levels of the outcomes are reported between parentheses in the column headings; In the unadjusted analyses only trajectory membership was included as predictor; In the adjusted analyses trajectory membership and wave 1 total cumulative risk (i.e., sum of the number of child- and environmental-level risk factors) were used a predictors); Low = Low CP; CH-LIM = Childhood-Limited CP; AO = Adolescent-Onset CP; CH-PER = Childhood-Persistent CP; DSM = DSM-oriented problem scale; OR = odds ratio; 95% CI = confidence interval; significant associations are in bold.

*Remained significant after controlling for the total number of risk factors (details can be retrieved from Supplementary Table S9)

[#]Became significant after controlling for the total number of risk factors (details can be retrieved from Supplementary Table S9).

showing that youth with childhood-onset CP are higher in callous-unemotional traits than youth with adolescent-onset CP (Dandreaux & Frick, 2009).

Another important question is if singular risk factors are helpful to identify children in the childhood-limited CP trajectory, which is why this later trajectory was contrasted with the childhood-persistent CP trajectory. Few child-level (i.e. fearlessness, callous-unemotional traits, and impulsivity-need for stimulation) and environmental-level (i.e., non-intact family) risk factors were predictive of a childhood-persistent CP trajectory classification. But here again, only two (i.e., fearlessness and non-intact family) risks factors remained significantly associated after controlling for wave 1 conduct problems. This finding underscores the importance of fearless temperament as a starting point in the development of conduct problems, as suggested by the recently proposed Interfear model (e.g., Fanti et al., 2023, 2024). According to this model, fearlessness places children at risk for developing CP by evoking negative responses from the environment, such as hostile parenting, which increases the likelihood of CU traits and eventually CP. Still, findings, overall, suggest that few unique singular risk factors help to separate children at risk for persistent conduct problems from those whose conduct problems are limited to childhood, a concern that has been raised earlier (Moffitt et al., 2008). However, evidence from other studies indicated that additional child-level (e.g., under controlled temperament and unresponsive to punishment cues) and environmental-level (e.g., parental criminal convictions and maternal prenatal features) risks that were not captured in our study may contribute to such a distinction (e.g., Barker et al., 2011; Barker & Maughan, 2009; Odgers et al., 2007). Clearly, more work remains to be done to fully understand the developmental antecedents of conduct problem trajectories.

The present study also considered cumulative risk indices in addition to singular risk factors. When controlling for their overlap, both the cumulative child-level risk and the cumulative environmental-level risk scores were uniquely associated with the three CP trajectories, relative to the low CP trajectory (Table 4). Yet, only cumulative child-level risk was also prospectively positively associated with the childhood-persistent (vs. childhood-limited and adolescent-onset) CP trajectory, and negatively associated with the adolescent-onset (vs. childhood-limited) trajectory. Thus, child-level risk factors appear to be more useful to identify children who are at risk to exhibit conduct problems than environmental-level risk factors, at least based on those included in the current investigation. Finally, the total cumulative risk score was significantly prospectively associated with all three CP trajectories, regardless of the contrast used (see Supplementary Table S5). These findings, along with the few differences across trajectories in terms of singular risk factors (supra), support the idea that differences between the three CP trajectories are quantitative rather than qualitative (Fairchild et al., 2013). Cumulative risk indices have rarely been used when trying to predict developmental trajectories of conduct problems, whilst the sole study that did use such index only contrasted the three CP trajectories with the low CP trajectory and scrutinized different risk factors at different ages (Gutman et al., 2019). Therefore, our findings, while requiring replication, suggest that cumulative effects are worth considering when studying CP trajectories, as recommended by Gutman and colleagues (2019).

Developmental outcomes of conduct problems trajectories

The total cumulative risk score that was assessed at wave 1 was significantly positively associated with all but one of the teacher- and child self-rated developmental outcomes in adolescence, assessed 11 years later. Therefore, we focus here on the prospective associations between the CP trajectories and the outcomes after controlling for total cumulative risk. Relative to the low CP trajectory, children in the childhood-persistent and AO CP trajectories were at an increased risk for future poorer behavioral, social, and educational outcomes. However, children in the childhood-limited CP trajectory were also more likely to have higher levels of conduct problems, bullying behavior, limited prosocial emotions, and to have more delinquent friends, as compared to the low CP trajectory. These findings indicate that children in the childhood-limited CP trajectory do not experience complete recovery in middle adolescence, a finding that aligns with studies that followed these children up into (emerging) adulthood (e.g., Bevilacqua et al., 2018; Sentse et al., 2017). Yet, participants with childhood-limited CP were less likely than their counterparts with childhood-persistent CP to exhibit all teacher-rated developmental outcomes as well as child-self-rated delinquency and anxiety problems, a finding that partially was replicated when contrasting the childhood-limited with the adolescent-onset CP trajectory. This finding supports prior conclusions that children in the childhood-limited CP trajectory are at the least risk for maladjustment later in life (e.g., Bevilacqua et al., 2018). Importantly, this study also shows that children with childhood-persistent CP were at a higher risk for conduct and affective problems and poor academic performance than those with adolescent-onset CP, even after controlling for total cumulative risk. However, both CP trajectories did not significantly differ in child self-reported delinquency, bullying, and rule breaking at school, suggesting that by mid-adolescence the childhood-persistent and adolescent-onset CP trajectories are indistinguishable regarding antisocial behavior (Moffit, 2018).

Strengths and limitations

This study has various strengths, including the availability of a relatively large sample of children that were followed over 11 years, the reliance on multiple informants, and the usage of well-established questionnaires to tap developmental antecedents and outcomes. Nevertheless, findings must be interpreted in the context of some important limitations. First, to avoid temporal overlap and same-reporter bias between antecedents, CP trajectories, and outcomes, only teacher-rated conduct problems that were assessed from wave 2 to wave 5 were used in our trajectory analyses. Therefore, it cannot be excluded that alternative trajectories (e.g., Cyr et al., 2022) would emerge if parent- and teacher-rated conduct problems across all six waves would have been used in our trajectory analyses. Second, the age-span that is covered in our CP trajectories did not exceed middle adolescence. So, the current study does not allow testing if children in the adolescent-onset trajectory could be further divided into adolescent-limited and adolescent-persistent subgroups (e.g., Fairchild et al., 2013). Third, attrition analyses not surprisingly showed that outcome data was significantly more missing for children in the childhood-limited and childhood-persistent trajectories. Thus, participants with the most severe levels of conduct problems in middle adolescence likely have dropped out at the time of the wave 6 assessment. Finally, the analytical approach did not account for

https://doi.org/10.1017/S0954579424001949 Published online by Cambridge University Press

the classification errors that may underestimate the association between class membership with predictors and outcomes.

Implications

In the absence of advance knowledge of long-term persistence, it is impossible for practitioners to know if conduct problems in young children will persist or be limited to childhood (Moffitt et al., 2008). As shown in this study, singular child- and environmental-level risk factors will likely be of little use to help to identify which children with childhood-onset CP are at higher need for intervention. Indeed, even after controlling for conduct problems, the estimates for fearless temperament had overlapping confidence intervals when trying to distinguish childhood-onset CP trajectories from the low CP trajectory. Interestingly, our three cumulative risk scores (i.e., child-level, environmental-level, and total) were prospectively associated with multiple teacher- and child self-rated developmental outcomes at age 14 to 16 years, even after controlling for conduct problems at baseline (i.e., wave 1). This finding dovetails with and extends prior work showing that the number of risks in early childhood predicts behavior problems in adolescence (e.g., Appleyard et al., 2005). Thus, to promote healthy outcomes, it might be more relevant to screen and to try reducing the number of risk factors, irrespective of CP trajectory the child will follow, pointing to the importance of early preventions. This is particularly relevant given that the cumulation of risk also helps to identify children who are likely to exhibit conduct problems in adolescence.

The utility of the age-of-onset distinction in adolescence has been questioned, for example, because reliable reporters about the adolescent's childhood behavior might not be available and because retrospective reports about age-of-onset of conduct problems is inaccurate (Moffit et al., 2008). Our findings support concerns about the usefulness of the age-of-onset distinction when dealing with adolescents with conduct problems, especially since a childhood (versus adolescent) onset of CP was not as predictive of poor developmental outcomes as would be expected. Indeed, after controlling for total cumulative risk, childhood-persistent and adolescent-onset trajectories of CP only significantly differ in three out of the 13 developmental outcomes under investigation. However, when comparing both CP trajectories with the low CP trajectory, the pattern of findings for childhood-persistent and adolescent-onset trajectories was similar in 11 developmental outcomes. Notwithstanding that childhood-persistent CP trajectory showed higher risk (i.e., greater odds ratios), relative to low CP trajectory, than did adolescent-onset CP trajectory, findings do underscore the importance to identify adolescents with conduct problems, regardless of whether these problems first emerged in or after childhood. Doing so might help to reduce the high societal costs in adulthood caused by individuals with childhood-persistent and adolescent-onset conduct problems (Rivenbark et al., 2018).

Supplementary material. The supplementary material for this article can be found at https://doi.org/10.1017/S0954579424001949.

Acknowledgments. We are grateful to Karlstad University and Karlstad municipality for their collaboration.

Funding statement. Waves 1–3 of the SOFIA study were funded by a grant from the Swedish Research Council (#2007-2440). Waves 4 and 6 were funded by Örebro University with support from Karlstad municipality and Karlstad University. This work was also supported by the Swedish Research Council for Health, Working Life and Welfare (KH grant ID 2023-01050), and the Swedish Research Council (LF, grant number 2023-01468). The writing of the manuscript was also supported by a Fonds Wetenschappelijk Onderzoek (FWO) Odysseus Grant (G0H7818N) and an FWO Research Project (G007720N) awarded to Olivier F. Colins.

Competing interests. The authors have no conflicts of interest to declare.

References

Achenbach, T. M., Dumenci, L., & Rescorla, L. A. (2001). *Ratings of relations between DSM-IV diagnostic categories and items of the CBCL/6-18, TRF, and YSR* (pp. 1–9). University of Vermont. https://doi.org/10.1111/j.1469-7610.2004.00351.x

APA (2013). *Diagnostic and statistical manual of mental disorders* (4ed.). American Psychiatric Publishing.

Appleyard, K., Egeland, B., Van Dulmen, M. H. M., & Alan Sroufe, L. (2005). When more is not better: The role of cumulative risk in child behavior outcomes. *Journal of Child Psychology and Psychiatry*, *46*, 235–245. https://doi.org/10.1111/j.1469-7610.2004.00351.x

Bai, S., & Lee, S. S. (2017). Early-onset conduct problems: Predictions from daring temperament and risk taking behavior. *Journal of Psychopathology and Behavioral Assessment*, *39*, 575–584. https://doi.org/10.1007/s10862-017-9612-z

Barker, C., Pistran, N., & Elliot, R. (1994). *Research methods in clinical and counselling psychology*. Wiley.

Barker, E. D., & Maughan, B. (2009). Differentiating early-onset persistent vs. childhood-limited conduct problem youth. *American Journal of Psychiatry*, *166*, 900–908. https://doi.org/10.1176/appi.ajp.2009.08121770

Barker, E. D., Oliver, B. R., & Maughan, B. (2010). Co-occurring problems of early onset persistent, childhood limited, and adolescent onset conduct problem youth. *Journal of Child Psychology and Psychiatry*, *51*, 1217–1226. https://doi.org/10.1111/j.1469-7610.2010.02240.x

Barker, E. D., Oliver, B. R., Viding, E., Salekin, R. T., & Maughan, B. (2011). The impact of prenatal maternal risk, fearless temperament and early parenting on adolescent Callous-unemotional traits: A 14-year longitudinal investigation. *Journal of Child Psychology and Psychiatry*, *52*, 878–888. https://doi.org/10.1111/j.1469-7610.2011.02397.x

Bauer, A., Hammerton, G., Fraser, A., Fairchild, G., & Halligan, S. L. (2021). Associations between developmental timing of child abuse and conduct problem trajectories in a UK birth cohort. *BMC Psychiatry*, *21*, 89. https://doi.org/10.1186/s12888-021-03083-8

Bevilacqua, L., Hale, D., Barker, E. D., & Viner, R. (2018). Conduct problems trajectories and psychosocial outcomes: A systematic review and meta-analysis. *European Child & Adolescent Psychiatry*, *27*, 1239–1260. https://doi.org/10.1007/s00787-017-1053-4

Clark, L., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological Assessment*, *7*, 309–319.

Colins, O. F., Andershed, H., Frogner, L., Lopez-Romero, L., Veen, V., & Andershed, A. K. (2014). A new measure to assess psychopathic personality in children: The child problematic traits inventory. *Journal of Psychopathology and Behavioral Assessment*, *36*, 4–21. https://doi.org/10.1007/s10862-013-9385-y

Colins, O. F., Fanti, K. A., & Andershed, H. (2021). The DSM-5 limited prosocial emotions specifier for conduct disorder: Comorbid problems, prognosis, and antecedents. *Journal of the American Academy of Child & Adolescent Psychiatry*, *60*, 1020–1029. https://doi.org/10.1016/j.jaac.2020.09.022

Connell, A. M., & Goodman, S. H. (2002). The association between psychopathology in fathers vs. mothers and children's internalizing and externalizing behavior problems: A meta-analysis. *Psychological Bulletin*, *128*, 746–773. https://doi.org/10.1037/0033-2909.128.5.746

Cyr, M., Zheng, Y., & McMahon, R. J. (2022). A long-term look at "early starters": Predicting adult psychosocial outcomes from childhood conduct problem trajectories. *Development and Psychopathology*, *34*, 225–240. https://doi.org/10.1017/S0954579420000760

Dandreaux, D. M., & Frick, P. J. (2009). Developmental pathways to conduct problems: A further test of the childhood and adolescent-onset distinction.

Journal of Abnormal Child Psychology, *37*, 375–385. https://doi.org/10.1007/s10802-008-9261-5

Deater-Deckard, K., Dodge, K. A., Bates, J. E., & Pettit, G. S. (1998). Multiple risk factors in the development of externalizing behavior problems: Group and individual differences. *Development and Psychopathology*, *10*, 469–493. https://doi.org/10.1017/S0954579498001709

DuPaul, G. J., Power, T. J., Anastopoulos, A. D., & Reid, R. (1998). *ADHD rating scale—IV: Checklists, norms, and clinical interpretation*, vol. *viii*, (pp. 79). The Guilford Press.

Evans, G. W., Li, D., & Whipple, S. S. (2013). Cumulative risk and child development. *Psychological Bulletin*, *139*, 1342–1396. https://doi.org/10.1037/a0031808

Fairchild, G., Hawes, D. J., Frick, P. J., Copeland, W. E., Odgers, C. L., Franke, B., Freitag, C. M., & De Brito, S. A. (2019). Conduct disorder. *Nature Reviews Disease Primers*, *5*, 1–25. https://doi.org/10.1038/s41572-019-0095-y

Fairchild, G., van Goozen, S. H. M., Calder, A. J., & Goodyer, I. M. (2013). Research review: Evaluating and reformulating the developmental taxonomic theory of antisocial behaviour. *Journal of Child Psychology and Psychiatry*, *54*, 924–940. https://doi.org/10.1111/jcpp.12102

Fanti, K. A., & Henrich, C. C. (2010). Trajectories of pure and co-occurring internalizing and externalizing problems from age 2 to age 12: Findings from the national institute of child health and human development study of early child care. *Developmental Psychology*, *46*, 1159–1175. https://doi.org/10.1037/a0020659

Fanti, K. A., Mavrommatis, I., Colins, O., & Andershed, H. (2023). Fearlessness as an underlying mechanism leading to conduct problems: Testing the intermediate effects of parenting, anxiety, and Callous-unemotional traits. *Research on Child and Adolescent Psychopathology*, *51*, 1115–1128. https://doi.org/10.1007/s10802-023-01076-7

Fanti, K. A., Mavrommatis, I., Díaz-Vázquez, B., López-Romero, L., Romero, E., Álvarez-Voces, M., Colins, O. F., Andershed, H., & Thomson, N. (2024). Fearlessness as an underlying mechanism leading to conduct problems: Testing the INTERFEAR model in a community sample in Spain. *Children*, *11*, 546. https://doi.org/10.3390/children11050546

Fontaine, N. M., McCrory, E. J., Boivin, M., Moffitt, T. E., & Viding, E. (2011). Predictors and outcomes of joint trajectories of Callous-unemotional traits and conduct problems in childhood. *Journal of Abnormal Psychology*, *120*, 730–742. https://doi.org/10.1037/a0022620

Frick, P. J. (2009). Extending the construct of psychopathy to youth: Implications for understanding, diagnosing, and treating antisocial children and adolescents. *The Canadian Journal of Psychiatry*, *54*, 803–812. https://doi.org/10.1177/070674370905401203

Frick, P. J. (2021). Testing the validity of the limited prosocial emotions specifier. *Journal of the American Academy of Child and Adolescent Psychiatry*, *60*, 952–954. https://doi.org/10.1016/j.jaac.2020.12.020

Frick, P. J. (2022). We do know that multiple dimensions of psychopathy can contribute to research on and diagnosis of conduct disorder: The question is how. *Clinical Psychology Review*, *98*, 102215. https://doi.org/10.1016/j.cpr.2022.102215

Frick, P. J., Ray, J. V., Thornton, L. C., & Kahn, R. E. (2014). Can Callous-unemotional traits enhance the understanding, diagnosis, and treatment of serious conduct problems in children and adolescents? A comprehensive review. *Psychological Bulletin*, *140*, 1–57. https://doi.org/10.1037/a0033076

Goulter, N., Cyr, M., Kotler, J. S., Zheng, Y., & McMahon, R. J. (2021). Childhood conduct problems trajectories are associated with distinct antisocial process screening device dimensions. *Journal of Psychopathology and Behavioral Assessment*, *43*, 455–465. https://doi.org/10.1007/s10862-020-09863-y

Gutman, L. M., Joshi, H., & Schoon, I. (2019). Developmental trajectories of conduct problems and cumulative risk from early childhood to adolescence. *Journal of Youth and Adolescence*, *48*, 181–198. https://doi.org/10.1007/s10964-018-0971-x

Heron, J., Maughan, B., Dick, D. M., Kendler, K. S., Lewis, G., Macleod, J., Munafò, M., & Hickman, M. (2013). Conduct problem trajectories and alcohol use and misuse in mid to late adolescence. *Drug and Alcohol Dependence*, *133*, 100–107. https://doi.org/10.1016/j.drugalcdep.2013.05.025

Kretschmer, T., Hickman, M., Doerner, R., Emond, A., Lewis, G., Macleod, J., Maughan, B., Munafò, M. R., & Heron, J. (2014). Outcomes of childhood conduct problem trajectories in early adulthood: Findings from the ALSPAC study. *European Child & Adolescent Psychiatry*, *23*, 539–549. https://doi.org/10.1007/s00787-013-0488-5

Langevin, S., Caspi, A., Barnes, J. C., Brennan, G., Poulton, R., Purdy, S. C., Ramrakha, S., Tanksley, P. T., Thorne, P. R., & Wilson, G. (2022). Life-course persistent antisocial behavior and accelerated biological aging in a longitudinal birth cohort. *International Journal of Environmental Research and Public Health*, *19*, 14402. https://doi.org/10.3390/ijerph192114402

Martins-Silva, T., Bauer, A., Matijasevich, A., Munhoz, T. N., Barros, A. J. D., Santos, I. S., Tovo-Rodrigues, L., & Murray, J. (2024). Early risk factors for conduct problem trajectories from childhood to adolescence: The 2004 Pelotas (BRAZIL) birth cohort. *European Child & Adolescent Psychiatry*, *33*, 881–895. https://doi.org/10.1007/s00787-023-02178-9

Martins-Silva, T., Bauer, A., Matijasevich, A., Santos, I., Barros, A., Ekelund, U., Tovo-Rodrigues, L., & Murray, J. (2022). Educational performance and conduct problem trajectories from childhood to adolescence: Observational and genetic associations in a Brazilian birth cohort. *JCPP Advances*, *2*, e12105. https://doi.org/10.1002/jcv2.12105

Moffitt, T. E. (1993). Adolescence-limited and life-course-persistent antisocial behavior: A developmental taxonomy. *Psychological Review*, *100*, 674–701. https://doi.org/10.1037/0033-295X.100.4.674

Moffitt, T. E. (2018). Male antisocial behaviour in adolescence and beyond. *Nature Human Behaviour*, *2*, 177–186. https://doi.org/10.1038/s41562-018-0309-4

Moffitt, T. E., Jaffee, S. R., Kim-Cohen, J., Koenen, K. C., Odgers, C. L., Slutske, W. S., & Viding, E. (2008). Research review: DSM-V conduct disorder: Research needs for an evidence base. *Journal of Child Psychology and Psychiatry*, *49*, 3–33. https://doi.org/10.1111/j.1469-7610.2007.01823.x

Muthén, B. (2000). Methodological issues in random coefficient growth modeling using a latent variable framework: Applications to the development of heavy drinking ages 18–37. In *Multivariate applications in substance use research* (pp. 113–140). Psychology Press.

Muthén, B. O., & Muthén, L. K. (2010). *Mplus 6.1*. Muthén, B. O., & Muthén, L. K..

Nagin, D. (2005). *Group-based modeling of development*. Harvard University Press, https://doi.org/10.4159/9780674041318

Nagin, D. S., & Tremblay, R. E. (2001). Analyzing developmental trajectories of distinct but related behaviors: A group-based method. *Psychological Methods*, *6*, 18–34. https://doi.org/10.1037/1082-989X.6.1.18

Odgers, C. L., Caspi, A., Broadbent, J. M., Dickson, N., Hancox, R. J., Harrington, H., Poulton, R., Sears, M. R., Thomson, W. M., & Moffitt, T. E. (2007). Prediction of differential adult health burden by conduct problem subtypes in males. *Archives of General Psychiatry*, *64*, 476–484. https://doi.org/10.1001/archpsyc.64.4.476

Olweus, D. (1996). The revised Olweus Bully/Victim Questionnaire. Mimeo. Bergen, Norway: Research Center for Health Promotion (HEMIL Center), University of Bergen. https://doi.org/10.1037/t09634-000

Ram, N., & Grimm, K. (2007). Using simple and complex growth models to articulate developmental change: Matching theory to method. *International Journal of Behavioral Development*, *31*, 303–316. https://doi.org/10.1177/0165025407077

Rescorla, L. A., Bochicchio, L., Achenbach, T. M., Ivanova, M. Y., Almqvist, F., Begovac, I., Bilenberg, N., Bird, H., Dobrean, A., Erol, N., Fombonne, E., Fonseca, A., Frigerio, A., Fung, D. S. S., Lambert, M. C., Leung, P. W. L., Liu, X., Marković, I., Markovic, J., … & Verhulst, F. C. (2014). Parent–teacher agreement on children's problems in 21 societies. *Journal of Clinical Child & Adolescent Psychology*, *43*, 627–642. https://doi.org/10.1080/15374416.2014.900719

Rivenbark, J. G., Odgers, C. L., Caspi, A., Harrington, H., Hogan, S., Houts, R. M., Poulton, R., & Moffitt, T. E. (2018). The high societal costs of childhood conduct problems: Evidence from administrative records up to age 38 in a longitudinal birth cohort. *Journal of Child Psychology and Psychiatry*, *59*, 703–710. https://doi.org/10.1111/jcpp.12850

Salekin, R. T. (2016). Psychopathy in childhood: Why should we care about grandiose-manipulative and daring-impulsive traits? *The British Journal of Psychiatry*, *209*, 189–191. https://doi.org/10.1192/bjp.bp.115.179051

Salekin, R. T. (2022). Some critical comments on the Frick, 2022 paper titled, some critical considerations in applying the construct of psychopathy to research and classification of childhood disruptive behavior disorders. *Clinical Psychology Review*, *98*, 102214. https://doi.org/10.1016/j.cpr.2022.10221

Sentse, M., Kretschmer, T., De Haan, A., & Prinzie, P. (2017). Conduct problem trajectories between Age 4 and 17 and their association with behavioral adjustment in emerging adulthood. *Journal of Youth and Adolescence*, *46*, 1633–1642. https://doi.org/10.1007/s10964-016-0476-4

Thorell, L. B., Chistiansen, H., Hammar, M., Berggren, S., Zander, E., & Bölte, S. (2018). Standardization and cross-cultural comparisons of the swedish conners 3® rating scales. *Nordic Journal of Psychiatry*, *72*, 613–620. https://doi.org/10.1080/08039488.2018.1513067

Woodward, L. J., Fergusson, D. M., & Horwood, L. J. (2002). Romantic relationships of young people with childhoodand adolescent onset antisocial behavior problems. *Journal of Abnormal Child Psychology*, *30*, 231–243. https://doi.org/10.1023/A:1015150728887.

https://doi.org/10.1017/S0954579424001949 Published online by Cambridge University Press